REMARKS

In the Office Action mailed on March 22, 2002, claims 1, 3-9, 11-20, and 22-31 were rejected under 35 U.S.C. § 112, first paragraph, as not being enabled; claims 1, 3-9, 11-20, and 22-31 were rejected under 35 U.S.C. § 112, first paragraph as having an inadequate written description; claims 1, 3-9, 11-20, and 22-31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Misaka and Baumann in view of the Examiner's own experience and the taking of Official Notice; claims 1, 3-9, 11-20, 22-26, and 28-31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada or Misaka or Baumann or Husinsky in view of Kinema/SIM or Reeves or Cohen; and claims 1, 3-9, 11-20, and 22-31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ohira in view of Kinema/SIM or Reeves or Cohen. The foregoing rejections are respectfully traversed.

Claims 1, 3-9, 11-20, and 22-31 are pending in the subject application, of which claims 1, 12, 16, 20, and 22-24 are independent. Claims 1, 16, 20, 23, and 24 are amended. Care has been exercised to avoid the introduction of new matter. A Version With Markings To Show Changes Made to the specification and amended claims is included herewith.

Rejections Under 35 U.S.C. § 112, first paragraph:

The Applicants respectfully submit that the Examiner may download a trial version of the software at http://www.cachesoftware.com/materialsexplorer/index.shtml.

In items 6-8, on pages 3-4 of the Office Action, the Examiner asserted that "[t]here are no functional limitations which refer to 'absorbate' [sic] and 'substrate' other than *denotation* of the individual particles. ... Therefore, any prior art which recites simulation of a trajectory of a 'combined particle' is interpreted as reading on the claims." (emphasis in original) The Applicants respectfully assert that the Examiner is not placing any relevance on the terms 'adsorbate' and 'substrate' as those terms are recited in the claims. The Specification discloses that the adsorbate particle collides with the substrate particle (Specification, p. 10, lines 15-16) and that particles have adjustable properties, including the emission source, the temperature control particle, the fixed particle, the free particle, etc. (Specification, Fig. 4; p. 32, lines 4-5 and 14-15). In addition, claims 1, 3-9, 11-20, and 22-31 are amended herein, taking the Examiner's comments into consideration.

The Applicants respectfully request that the Examiner withdraw the foregoing rejections.

Examiner's Claim Interpretations and Claim Amendments:

In items 6-8, on pages 3-4 of the Office Action, the Examiner asserted his claim interpretations. Specifically, in item 7, the Examiner stated that "[t]here are no functional limitations which refer to 'absorbate' [sic] and 'substrate' other than *denotation* of the individual particles. ... Therefore, any prior art which recites simulation of a trajectory of a 'combined particle' is interpreted as reading on the claims." (emphasis in original)

From the Examiner's comments, it appears as if the Examiner is not placing any relevance on the terms 'adsorbate' and 'substrate' as the Applicants are using them. However, the Applicants note that the Specification discloses that the adsorbate particle collides with the substrate particle (p. 10, lines 15-16) and that particles have adjustable properties, including the emission source, the temperature control particle, the fixed particle, the free particle, etc. (Fig. 4; p. 32, lines 4-5, 14-15).

Claims 1, 16, 20, 23, and 24 are amended to include that "the information includes a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction."

Rejections Under 35 U.S.C. § 103(a):

Examiner's Own Experience:

In addition, the Applicant respectfully traverses the Examiner's taking of Official Notice and the Examiner's assertions that the Examiner has personally done (e.g., in regard to Monte Carlo simulations) or seen (e.g., in regard to displays) embodiments of the claimed invention, and requests that the Examiner cite a reference or references in support of each such assertion, present an affidavit supporting each such assertion, or withdraw his reliance upon each such assertion, as required by MPEP § 2144.03.

Inherency:

The Applicants respectfully traverse the Examiner's assertions of inherency (e.g., in regard to particle simulators and cluster simulation). The inherent teachings of a prior art reference are questions of fact. In re Napier, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995). With respect to core factual findings in a determination of patentability, the Examiner cannot simply reach conclusions based on his own understanding or experience, or on an assessment of what would be basic knowledge or common sense. In re Zurko, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001). Rather, the Examiner must point to some concrete evidence in the reference in support of his findings. Id.

Obviousness:

The Applicants respectfully traverse the Examiner's assertions of obviousness (e.g., in regard to particle generation). With respect to core factual findings in a determination of patentability, the Examiner cannot simply reach conclusions based on his own understanding or experience, or on an assessment of what would be basic knowledge or common sense. In re Zurko, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001). Rather, the Examiner must point to some concrete evidence in the reference in support of his findings. Id.

Motivation to Combine the References:

MPEP § 2142 states that "[w]hen the motivation to combine the teachings of the references is not immediately apparent, it is the duty of the examiner to explain why the combination of the teachings is proper." The Examiner is required to present actual evidence and make particular findings related to the motivation to combine the teachings of the references. In re Kotzab, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); In re Dembiczak, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). Broad conclusory statements regarding the teaching of multiple references, standing alone, are not "evidence." Dembiczak, 50 USPQ2d at 1617. "'The factual inquiry whether to combine the references must be thorough and searching.'" In re Lee, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002) (citing McGinley v. Franklin Sports, Inc., 60 USPQ2d 1001, 1008 (Fed. Cir. 2001)). The factual inquiry must be based on objective evidence of record, and cannot be based on subjective belief and unknown authority. Id. at 1433-34. The Examiner must explain the reasons that one of ordinary skill in the art would have been

motivated to select the references and to combine them to render the claimed invention obvious. In re Rouffet, 47 USPQ2d 1453, 1459 (Fed. Cir. 1998).

The Examiner has not presented any evidence why any of the references would have been combined. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. MPEP § 2143.01. Specifically, there must be a suggestion or motivation in the references to make the combination or modification. Id. The Examiner does not even assert that someone of ordinary skill in the art would have been motivated to combine any of the references at the time the invention was made. Further, such motivation does not appear anywhere in any of the references, and the Examiner has not presented any actual evidence in support of the same. Such a basis does not adequately support the combination of references; therefore, the combinations are improper and must be withdrawn.

Misaka or Baumann in View of the Examiner's Own Experience and the Taking of Official Notice:

Baumann discloses that incoming spheres nearby the surface are generated by a Monte Carlo method. Baumann does not disclose individual particles which each have a corresponding emission source as recited, for example, in claim 1. Thus, Baumann does not disclose that, for each individual particle, a kinetic condition setting unit sets a region indicating a position of the corresponding emission source, as recited, for example, in claim 1.

The Examiner specifically relies on the disclosure on page 4.4.2 of Baumann, relating to molecular dynamic simulation. However, it is respectfully submitted that this portion of Baumann does not inherently indicate the existence of an emission source for each particle.

FIG. 1 of Misaka discloses a particle transport model 15 for use in a simulator. The particle transport model 15 of Misaka is somewhat similar to an emission source of various embodiments of the present invention. However, Misaka does not disclose how to use such a source in a manner as in the present invention. For example, Misaka does not disclose or suggest the size of the source or the distance between the source and a substrate. Therefore, it is unclear how the particle transport model of Misaka would be used as, for example, an emission source such as recited in claim 1. Thus, Misaka does not disclose that, for each individual particle, a kinetic condition setting unit sets a region indicating a position of the

corresponding emission source, as recited, for example, in claim 1.

In summary, neither Baumann nor Misaka, taken individually or in combination, discloses a particle formed of both adsorbate particles and substrate particles, where each adsorbate particle has a corresponding emission source, and that the adsorbate particles are generated in accordance with the positions of the emission sources, as recited in various of the claims.

Further, the references do not disclose or suggest that the information includes a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction, as recited in the claims, as amended herein.

In view of the above, it is respectfully submitted that the rejection is overcome.

(Yamada or Misaka or Baumann or Husinsky) in View of (Kinema/SIM or Reeves or Cohen):

The above comments for distinguishing over Misaka and Bauman are incorporated as if expressly set forth herein.

Reeves relates to modeling "fuzzy" objects such as clouds, smoke, water and fire. Reeves does not disclose the use of adsorbate particles or substrate particles. Thus, Reeves cannot achieve, and does not address, various objects of various embodiments of the present invention, such those directed to crystal growth, surface adsorption, and surface damage.

The "generation shape" of Reeves is somewhat similar to an emission source of various embodiments of the present invention. However, generally, the present invention relates to the generation of atoms or molecules, and not the "fuzzy" objects of Reeves. Therefore, for example, the manner of setting initial velocity of generated particles in various embodiments of the present invention is significantly different than anything in Reeves.

The Examiner specifically relies on the disclosure in Section 2.1 of Reeves, relating to particle disclosure, and Section 2.2 of Reeves, relating to particles having an initial position and velocity. However, the examples in Reeves relate to, for example, “a wall of fire and explosion” and “fireworks.” Reeves does not relate to molecular dynamics.

The Examiner also relies on pages 165-166 of Cohen. As should be understood from the examples in Cohen of “3. People Flow Simulation” and “4. Airbag Deployment Simulation,”

Cohen does not relate to molecular dynamics.

In summary, neither Reeves nor Cohen, taken individually or in combination, discloses a particle formed of both adsorbate particles and substrate particles, where each adsorbate particle has a corresponding emission source, and that the adsorbate particles are generated in accordance with the positions of the emission sources, as recited in various of the claims as amended herein.

Further, the references do not disclose or suggest that the information includes a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction, as recited in the claims, as amended herein.

In view of the above, it is respectfully submitted that the rejection is overcome.

Ohira in View of Kinema/SIM or Reeves or Cohen:

The above comments for distinguishing over Reeves and Cohen are incorporated as if expressly set forth herein.

Kinema/Sim does not relate to a particle formed of both adsorbate particles and substrate particles, where each adsorbate particle has a corresponding emission source, and that the adsorbate particles are generated in accordance with the positions of the emission sources, as recited in various of the claims.

As an example, Kinema/Sim cannot control the temperature of the substrate particles and it cannot stop movement of the substrate particle. Therefore, as an example, Kinema/Sim cannot simulate crystal growth, surface adsorption, and surface damage. As Kinema/Sim is not directed to, and cannot achieve, various objects of the present invention, Kinema/Sim should not be combined with the other references to reject the claimed invention.

Ohira does not disclose an adsorbate emission source. Therefore, for example, Ohira does not disclose how to set generation schedules and initial velocities for plural number of adsorbate particles. Thus, Ohira cannot achieve various objects of the present invention, and should not be combined with the other references to reject the claimed invention.

Further, the references do not disclose or suggest that the information includes a position of a corresponding emission source, a temperature, a chemical composition of the particle, a

region, a physical condition, a velocity of each atom forming the particle, and a direction, as recited in the claims, as amended herein.

In view of the above, it is respectfully submitted that the rejection is overcome.

The Applicants respectfully request that the Examiner withdraw the foregoing rejections.

There being no further objections or rejections, it is submitted that the application is in condition for allowance, which action is courteously requested. Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned

to attend to these matters. If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 8-22-2002

By:

Matthew Q. Ammon
Registration No. 50,346

700 Eleventh Street, NW, Suite 500
Washington, D.C. 20001
(202) 434-1500

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please AMEND claims 1, 16, 20, 23, and 24. The remaining claims are reprinted, as a convenience to the Examiner, as they presently stand before the U.S. Patent and Trademark Office.

1. (FIVE TIMES AMENDED) An apparatus for simulating phenomena of a particle formed of adsorbate particles and substrate particles, comprising:

a kinetic condition setting unit which sets information for defining a plurality of generation periods and a corresponding number of adsorbate particles to be generated during each generation period <u>wherein the information includes a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction</u>; and

a particle motion computing unit which generates the adsorbate particles in accordance with the information set by the kinetic condition setting unit and computes motion of the generated adsorbate particles, to simulate phenomena of said particle formed of adsorbate particles and substrate particles, each adsorbate particle having a corresponding emission source wherein

for each adsorbate particle, the kinetic condition setting unit sets a region indicating a position of the corresponding emission source, and

the particle motion computing unit generates each adsorbate particle in accordance with the position of the corresponding emission source.

2. (CANCELED)

3. (AS ONCE AMENDED) An apparatus as in claim 1, wherein

before generating the adsorbate particles, the particle motion computing unit generates the substrate particles.

4. (AS ORIGINAL) An apparatus as in claim 1, further comprising:

a display which allows a user to enter the information set by the kinetic condition setting unit.

5. (AS ONCE AMENDED) An apparatus as in claim 1, wherein
the kinetic condition setting unit sets information for generating the substrate particles.

6. (AS TWICE AMENDED) An apparatus as in claim 1, wherein
each adsorbate particle is formed of atoms;
the information set by the kinetic condition setting unit includes information indicating whether the atoms of a respective adsorbate particle are static against a center of mass of the adsorbate particle; and
when the particle motion computing unit generates an adsorbate particle and the information set by the kinetic condition setting unit indicates that the atoms of the respective adsorbate particle are not static against the center of mass, the particle motion computing unit provides a random orientation to the atoms of the adsorbate particle.

7. (AS ORIGINAL) An apparatus as in claim 6, further comprising:
a display which allows a user to enter the information set by the kinetic condition setting unit.

8. (AS TWICE AMENDED) An apparatus as in claim 1, wherein
each adsorbate particle is formed of atoms;
the information set by the kinetic condition setting unit includes information indicating whether the atoms of a respective adsorbate particle are static against a center of mass of the adsorbate particle; and
when the particle motion computing unit generates an adsorbate particle and the information set by the kinetic condition setting unit indicates that the atoms of the respective adsorbate particle are not static against the center of mass, the particle motion computing unit provides an initial velocity to the atoms of the adsorbate particle.

9. (AS TWICE AMENDED) An apparatus as in claim 1, wherein, when generating an adsorbate particle, the particle motion computing unit provides a random direction within a cone pointed at a substrate and being centered at a point of generation of center of mass velocity of the adsorbate particle.

10. (CANCELED)

11. (AS ORIGINAL) An apparatus as in claim 1, further comprising:

a display which displays the information set by the kinetic condition setting unit.

12. (AS TWICE AMENDED) An apparatus for simulating phenomena of a particle formed of adsorbate particles and substrate particles, each adsorbate particle having a corresponding emission source, the apparatus comprising:

an input device which allows a user to designate a region;

a kinetic condition setting unit which, for each adsorbate particle, sets the region designed by the user as a region indicating a position of the corresponding emission source; and

a particle motion computing unit which generates the adsorbate particles in accordance with the position of the corresponding emission source as indicated by the region designated by the user and computes motion of the generated adsorbate particles, to simulate phenomena of said particle formed of adsorbate particles and substrate particles.

13. (AS ORIGINAL) An apparatus as in claim 12, wherein the input device is a display.

14. (AS ORIGINAL) An apparatus as in claim 12, further comprising:

a display which displays the information set by the kinetic condition setting unit.

15. (AS ONCE AMENDED) An apparatus as in claim 14, wherein the display shows the adsorbate particles generated by the particle motion computing unit and indicates the motion computed by the particle motion computing unit.

16. (FIVE TIMES AMENDED) An apparatus for simulating phenomena of a particle formed of adsorbate particles and substrate particles, each adsorbate particle having a corresponding emission source, the apparatus comprising:

a kinetic condition setting unit which sets information for defining kinetic conditions of the adsorbate particles <u>wherein the information includes a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction</u>; and

a particle motion computing unit which generates the adsorbate particles in accordance

with the information set by the kinetic condition setting unit and the position of the corresponding emission source, and computes motion of the generated adsorbate particles, to simulate phenomena of said particle formed of adsorbate particles and substrate particles, each adsorbate particle having a corresponding emission source.

17. (AS TWICE AMENDED) An apparatus as in claim 16, wherein

the adsorbate particles move towards the substrate particles,

the kinetic condition setting unit sets a region for defining an initial position of the adsorbate particles, and

the apparatus further comprises a display which displays the relationship between the region set by the kinetic condition setting unit and a region indicating a position of a substrate particle forming said particle formed of adsorbate particles and substrate particles.

18. (AS ONCE AMENDED) An apparatus as in claim 17, wherein

the kinetic condition setting unit sets information for providing a direction of velocity to the adsorbate particles, and

the display shows the direction of velocity with respect to the region set by the kinetic condition setting unit and the region indicating the position of a respective substrate particle.

19. (AS ORIGINAL) An apparatus as in claim 16, further comprising:

a display which displays the information set by the kinetic condition setting unit.

20. (FIVE TIMES AMENDED) A computer-implemented method for simulating phenomena of a particle formed of adsorbate particles and substrate particles, each adsorbate particle having a corresponding emission source, the method comprising the steps of:

setting information for defining a plurality of generation periods and a corresponding number of adsorbate particles to be generated during each generation period <u>wherein the information includes a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction</u>;

generating the adsorbate particles in accordance with the information set in the setting step and the position of the corresponding emission sources;

computing motion of the generated adsorbate particles; and

simulating phenomena of said particle formed of adsorbate particles and substrate particles in accordance with the computed motion.

21. (CANCELED)

22. (AS FOUR TIMES AMENDED) A computer-implemented method for simulating phenomena of a particle formed of adsorbate particles and substrate particles, each adsorbate particle having a corresponding emission source, the method comprising the steps of:

setting, for each adsorbate particle, a region indicating a position of the corresponding emission source;

generating the adsorbate particles in accordance with the position of the corresponding emission source as indicated by the region set in the setting step;

computing motion of the generated adsorbate particles; and

simulating phenomena of said particle formed of adsorbate particles and substrate particles in accordance with the computed motion.

23. (FIVE TIMES AMENDED) A method for simulating phenomena of a particle formed of adsorbate particles and substrate particles, each adsorbate particle having a corresponding emission source, the method comprising:

setting information for defining kinetic conditions of the adsorbate particles <u>wherein the information includes a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction</u>;

displaying the set information;

generating the adsorbate particles in accordance with the set information and the positions of the corresponding emission sources; and

computing motion of the generated adsorbate particles, to simulate phenomena of said particle formed of adsorbate particles and substrate particles, each adsorbate particle having a corresponding emission source.

24. (FIVE TIMES AMENDED) An apparatus for simulating phenomena of a particle formed with adsorbate particles, comprising:

a kinetic condition setting unit which sets information for defining kinetic conditions of the

adsorbate particles wherein the information includes a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction; and

a particle motion computing unit which generates the adsorbate particles in accordance with the information set by the kinetic condition setting unit and computes motion of the generated adsorbate particles, to simulate phenomena of said particle formed with adsorbate particles, each adsorbate particle having a corresponding emission source, wherein

for each adsorbate particle, the kinetic condition setting unit sets a region indicating a position of the corresponding emission source, and

the particle motion computing unit generates each adsorbate particle in accordance with the position of the corresponding emission source as indicated by the region set by the kinetic condition setting unit.

25. (AS ORIGINAL) An apparatus as in claim 24, wherein the information set by the kinetic condition setting unit defines a plurality of generation periods and a corresponding number of adsorbate particles to be generated during each generation period by the particle motion computing unit.

26. (AS TWICE AMENDED) An apparatus as in claim 24, wherein

said particle formed with adsorbate particles is formed with both adsorbate particles and substrate particles,

the information set by the kinetic condition setting unit includes information for defining kinetic conditions of the substrate particles, and

the particle motion computing unit generates the substrate particles before generating the adsorbate particles.

27. (AS TWICE AMENDED) An apparatus as in claim 24, wherein

said particle formed with adsorbate particles is formed with both adsorbate particles and substrate particles,

each substrate particle includes a fixed particle and a temperature control particle,

the information set by the kinetic condition setting unit includes information for defining kinetic conditions of the fixed particle and the temperature control particle, and

the particle motion computing unit generates the fixed particle and the temperature control particle of each substrate particle in accordance with the information set by the kinetic condition setting unit.

28. (AS ORIGINAL) An apparatus as in claim 24, further comprising:
a display which displays the information set by the kinetic condition setting unit.

29. (AS TWICE AMENDED) An apparatus as in claim 24, wherein
each adsorbate particle includes a plurality of atoms;

the information set by the kinetic condition setting unit includes information indicating whether the atoms of a respective adsorbate particle are static against a center of mass of the adsorbate particle; and

when the particle motion computing unit generates an adsorbate particle and the information set by the kinetic condition setting unit indicates that the atoms of the respective adsorbate particle are not static against the center of mass, the particle motion computing unit provides a random orientation to the atoms of the adsorbate particle.

30. (AS ONCE AMENDED) An apparatus as in claim 29, wherein, when the particle motion computing unit generates an adsorbate particle and the information set by the kinetic condition setting unit indicates that the atoms of the respective adsorbate particle are not fixed against center of mass, the particle motion computing unit provides an initial velocity to the atoms of the adsorbate particle.

31. (AS TWICE AMENDED) An apparatus as in claim 24, wherein, when generating an adsorbate particle, the particle motion computing unit provides a random direction within a cone pointed at a substrate and being centered at a point of generation of center of mass velocity of the adsorbate particle.

32. (CANCELED)